
Family versus Individually Oriented Intervention for Weight Loss in Mexican American Women

JENNIFER H. COUSINS, PhD
DAVID S. RUBOVITS, PhD
J. KAY DUNN, PhD
REBECCA S. REEVES, MPH, RD
AMELIE G. RAMIREZ, DrPH
JOHN P. FOREYT, PhD

Five of the authors are with the Department of Medicine, Baylor College of Medicine. Dr. Cousins is Assistant Professor and Director of Health Promotion, Dr. Rubovits is Senior Research Assistant, Dr. Dunn is Associate Professor of Medicine and Director of the Design and Analysis Core, Ms. Reeves is Chief Dietitian, Nutrition Research Clinic, and Dr. Foreyt is Professor of Medicine and Director of the Nutrition Research Clinic. Dr. Ramirez is Assistant Director for Administration and Community Health Promotion at the University of Texas Health Sciences Center at San Antonio.

Tearsheet requests to Dr. Jennifer Cousins, Director of Health Promotion, Baylor College of Medicine, 1 Baylor Plaza, Rm. 176B, Houston, TX 77030; telephone 713-798-5770.

Synopsis

Mexican Americans are more likely to be obese than non-Hispanic whites, yet little research has been conducted on the treatment of obesity in Mexican Americans. The purpose of this study was to compare a family-based intervention with a traditional program oriented to the individual for

achieving weight loss by obese Mexican American women. A total of 168 obese women were randomly assigned to one of three groups. Group 1 served as a comparison group and received only printed materials on nutrition, exercise, and behavioral principles for weight loss. Subjects in the individual group (group 2) received the same printed information, but they also attended classes led by bilingual registered dietitians. Subjects in the family group (group 3) received materials and attended classes that emphasized a family-oriented approach to making changes in eating habits and exercise behavior. Spouses and children attended classes with subjects in this group.

Results revealed a significant linear trend in both body mass index and weight reduction across the groups, with losses greatest in the family group, followed by the individual group, and least in the comparison group. Both the individual and the family groups lost significantly more weight than the comparison group, although the difference between these two groups was not statistically significant. The results suggest that a culturally and linguistically appropriate program can achieve significant weight reduction among Mexican Americans. More research should be conducted on the effects of family and other types of social support on weight loss by Mexican Americans.

MEXICAN AMERICANS ARE THE SECOND largest and fastest growing minority group in the United States, and almost one-third of this population lives in the State of Texas (1). Several large epidemiologic studies have documented that Mexican Americans are more likely to be hypertensive, have higher cholesterol and triglyceride levels, and be diabetic than the general population (2-7). Although cardiovascular mortality rates are actually lower for Mexican Americans than for non-Hispanic whites, cardiovascular disease is the leading cause of death for Mexican Americans (8). Although the mechanisms underlying the development of cardiovascular disease and diabetes are not yet fully delineated, obesity and diet are clearly implicated as risk factors.

Almost half (45 percent) of the Mexican Americans sampled in one Texas community were 20 percent over ideal body weight (5), and those in another Texas community were four times as likely to be obese as lean (7). In the Hispanic Health and Nutrition Survey in 1982-84, 39 percent of Mexican American women ages 20 to 74 years were overweight (9). These prevalence rates are substantially higher than those reported for non-Hispanic Americans ages 20 to 74 years (10). For non-Hispanic white women, the prevalence of overweight was 25 percent, approximately 15 percentage points lower than in Mexican American women. Mexican Americans also tend to have more atherogenic patterns of body fat distribution (11,12) and to develop obesity at an earlier age than non-Hispanics (13).

Early weight gain has been associated with onset of diabetes in Mexican Americans, as was centralized and upper body fat (14). Obese Mexican Americans with centralized body fat were found to be at significantly greater risk for low high-density lipoprotein cholesterol, high total cholesterol, and high blood glucose levels than nonobese Mexican Americans, with the generalized obese tending to be at intermediate risk (12).

Socioeconomic, linguistic, and cultural barriers to health and nutrition information may place Mexican Americans at increased risk for obesity and cardiovascular disease. Average age, income, and education levels are lower than for non-Hispanic whites, and many speak little or no English (15,16). Both increased acculturation and socioeconomic status have been associated with decreases in obesity in Mexican American women, although the effects of acculturation on obesity prevalence were stronger than the effects of socioeconomic status (17). Traditional Mexican American culture emphasizes family stability and integrity, often subordinating the individual's needs to family needs and interests (18,19). Mexican Americans have not adopted the Anglo cultural ideal of leanness (7), are less knowledgeable regarding cardiovascular risk factors (20-22), and are less likely to control their weight through diet and exercise than non-Hispanic whites (23). Mexican Americans are also less likely to recognize sources of fat in the diet (24).

Several studies have documented distinct dietary intake patterns in Mexican Americans. Those living in south Texas consume both traditional Mexican food items, such as beans and tortillas (primarily flour), and foods not previously reported to be commonly consumed, such as beef (25). Mexican Americans also had higher intakes of cholesterol than whites (176.5 mg compared with 159.5 mg) even though they consumed fewer of their total calories as fat (35.1 percent compared with 37.9 percent for whites) (26). Dietary intake data from the San Antonio Heart Study revealed that Mexican Americans consumed more carbohydrate, saturated fat, and cholesterol than did Anglo Americans (27). Dietary behaviors related to cardiovascular disease tend to be more aggregated among Mexican Americans than Anglo Americans, due, in part, to Mexican Americans being more likely to eat all three meals as a family group (28).

In spite of the prevalence of obesity in this population, few weight control or dietary change studies have been conducted with Mexican Americans. Culturally relevant methods for decreasing

saturated fat and sodium intake and increasing exercise have been successful with Mexican American children and their families (29,30), and Mexican Americans have participated in other community-wide health education programs to reduce fat consumption (31). However, we have found no previously published studies of weight loss interventions developed specifically for Mexican Americans.

The primary objective of this study was to assess the effectiveness of a culturally sensitive, family-based weight-loss program for cardiovascular risk reduction in obese Mexican American women. A growing body of research supports the use of family-based interventions, rather than individually oriented programs, for weight loss (31-33). Obesity is heritable (34,35), as are the family's habits of caloric intake, physical activity, attitudes toward eating, food preferences, and communication patterns that promote specific eating and exercise behaviors (30,36,37). Because the Mexican American culture emphasizes the importance of family unity, it was hypothesized that including the family in the intervention would improve subjects' ability to make and maintain changes in their eating and exercise behavior. Thus the family intervention (group 3) was expected to lose more weight and maintain weight loss better than a traditional individually oriented group (group 2), which in turn was expected to be more successful than a comparison group (group 1).

Methods

Subjects. A total of three cohorts were recruited, one each year for a total of 168 subjects. Subjects were self-identified Mexican American women, ages 18 to 45 years, who were 20 to 100 percent above ideal body weight. All subjects were married and had at least one preschool-aged child. Families were recruited through media promotion and personal contacts in the local community, primarily through churches and health agencies. Subjects were excluded if they were hypertensive (diastolic blood pressure ≥ 115 mm per Hg), diabetic (fasting plasma glucose ≥ 140 mg per dl), or had any other chronic illness with dietary or exercise recommendations different from those proposed in the study. The present analyses include women for whom weight data were available at baseline, 3, 6, and 12 months.

Procedures. Subjects were stratified according to weight and randomly assigned to one of the three

treatment groups: (a) the manual-only comparison group, (b) the individual group, or (c) the family group. The manual-only group (group 1) received a bilingual manual consisting of a low fat eating plan, nutrition information, recipes, an exercise plan, and behavior modification strategies, based on a previously developed program (38) and modified to reflect the cultural values of the population. (The manual, "Cuidando el Corazon," is available upon request from the authors.) The eating plan was designed to help subjects achieve ideal body weight and to lower their plasma cholesterol and triglyceride levels. Fat intake comprised 30 percent of total calories, with saturated fat providing no more than 10 percent. Dietary protein supplied about 20 percent of total calories, and carbohydrates 50 percent. Cholesterol was limited to 300 mg per day, and sodium was reduced moderately. Calories were limited to 1,200 per day for women.

The Mexican American diet in Texas differs in composition from the diet of other ethnic groups (24,25,39), and a cookbook was prepared with recipes for fat-modified traditional Mexican American foods. Behavior modification strategies (for example, how to keep food records, control food accessibility and portion sizes, set goals, and reinforce oneself) were illustrated and described in simple terms. Information was also included on maintaining weight loss, emphasizing problem-solving, and preventing relapses (40). The manual was translated into Spanish by professional translators and back-translated by separate translators, and any discrepancies in meaning or style were resolved. Both Spanish and English versions were evaluated for their compatibility with cultural norms and values by bilingual health educators and by members of the Mexican American community from which the study sample was drawn.

The individual group (group 2) received "Cuidando el Corazon" and attended 24 weekly classes and 6 monthly classes taught by bilingual registered dietitians. Weekly classes provided individualized instruction in nutrition, feedback on subjects' food records, and the use of behavior modification techniques for weight loss. Classes also included group exercise, food tastings, cooking demonstrations, and videotaped instructions on preparing low fat foods. Six monthly maintenance classes followed the 6 months of weekly classes. Maintenance classes focused on problem-solving strategies for preventing or minimizing relapse following treatment (40). Group leaders emphasized an active, problem-solving approach which allowed subjects to observe low fat food preparation methods, to

'Socioeconomic, linguistic, and cultural barriers to health and nutrition information may place Mexican Americans at increased risk for obesity and cardiovascular disease. Average age, income, and education levels are lower than for non-Hispanic whites, and many speak little or no English.'

taste traditional foods made with little or no fat, and to enlist the support and assistance of the group in solving problems encountered in developing low fat eating and exercise habits.

The family group (group 3) also attended 24 weekly and six monthly classes taught by bilingual registered dietitians. They received a modified version of the "Cuidando el Corazon" manual that included information on partner support and parenting skills to encourage family changes in eating and exercise behaviors. Spouses were encouraged to attend classes with subjects, and separate classes were held for the preschool-aged children. The children's classes were based on a heart-healthy educational program for preschool and kindergarten children (41) that uses age-appropriate sensory experiences and games to teach simple concepts about heart-healthy foods and physical activity.

Weight and height were measured at baseline, 3, 6, and 12 months using a standard physician's scale. Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared. Acculturation into the U.S. lifestyle was measured with the Acculturation Rating Scale for Mexican Americans (42), a 1-page questionnaire that yields a score from 1 to 5 reflecting subjects' degree of acculturation.

Analyses. Repeated measures analysis of variance (ANOVA) (43) was used to test the hypothesis that the family intervention (group 3) would lose more weight and maintain weight loss better than the individual group (group 2) which in turn was expected to be more successful than the comparison group (group 1). The dependent factor was BMI measured at baseline, 3, 6, and 12 months.

Results

Results are presented for the 86 subjects for whom weight data are available from the baseline,

Table 1. Demographic characteristics of three groups of obese Mexican American women in a weight loss program

Group	Number	Age (years)		Acculturation ¹		Education (years)		Income (percent below \$10,000) ²
		Mean	SD	Mean	SD	Mean	SD	
Group 1	27	33.8	7.0	2.80	.80	10.6	3.1	27
Group 2	32	33.6	6.4	3.11	.62	9.6	3.3	23
Group 3	27	32.8	6.1	2.62	.93	10.2	3.1	22
Total	86	33.4	6.4	2.86	.80	10.1	3.2	24

¹ Measured by the Acculturation Rating Scale for Mexican Americans (42). Scale range is 1–5; very Mexican = 1, very anglicized = 5.

² N = 79.
NOTE: SD = standard deviation.

Table 2. Means and standard deviations (SD) for weight and body mass index at baseline and 3, 6, and 12 months by group

Group	Baseline		3 months		6 months		12 months	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Weight (kilograms)</i>								
1. Comparison	77	11.1	76.1	11.4	76.8	12	76.3	12.2
2. Individual	78.1	13.8	75.5	14.1	74.8	13.9	76	14.3
3. Family	74.2	12.8	71.2	12.6	69.7	12.7	70.4	14.6
<i>Body mass index (weight in kilograms divided by height in sq. meters)</i>								
1. Comparison	31.6	4.9	31.2	5.0	31.5	5.1	31.3	5.4
2. Individual	31.7	5.0	30.7	5.0	30.4	5.1	30.9	5.3
3. Family	30.3	4.5	29.0	4.5	28.4	4.6	28.7	5.5

‘While weight loss averages were small, they may have some clinical significance in a population known to be at risk for diabetes and hypertension. In other populations modest weight losses (10 lb.) have been found to have beneficial effects on blood pressure in mild hypertensives.’

3-month, 6-month, and 12-month measurements. The remaining 82 subjects were excluded because of missing data at any of the 3-, 6-, and 12-month measurement sessions. Preliminary ANOVA revealed no significant differences on any of the baseline measures, including initial BMI, initial weight, age, acculturation, years of education, or income between the 86 subjects included in these analyses and the 82 who were excluded.

Preliminary analyses were also performed to determine equality of the intervention groups at baseline. ANOVA revealed no significant differences between the three groups in years of educa-

tion, age, acculturation, income, initial weight, or BMI levels ($P > .05$, for each).

Demographic characteristics. Demographic characteristics are presented in table 1. Overall, subjects were young and had low levels of education and family income. Using the Acculturation Rating Scale for Mexican Americans (42), the majority of the sample was “truly bicultural.” That is, although they have adopted many of the values and behaviors of the majority culture, they maintain strong attachments to their Mexican heritage, primarily through language and their friendship and kinship networks.

Group differences in weight and BMI. Group means and standard deviations at baseline, 3, 6, and 12 months are reported for weight and BMI in table 2. Because BMI is a better measure of obesity than simple weight data (44), further analyses are reported with BMI data only. Multivariate analysis of variance with repeated measures yielded a significant group multiplied by (\times) time interaction for BMI (Wilk’s Lambda = .7817, $P < .003$), indicating an intervention effect over time. Repeated measures analyses were then run again on each of the

three combinations of intervention groups (groups 1-2, groups 1-3, and groups 2-3) to test the simple effects of the group \times time interaction. In order to control the type I error rate, the tests were judged at $P = .01$ (.05 divided by 3). There were significant group \times time interactions for the groups 1-2 (Wilk's Lambda = .7797, $P < .003$) and groups 1-3 (Wilk's Lambda = .7329, $P < .001$) comparisons. The groups 2-3 comparison did not yield a significant group \times time interaction (Wilk's Lambda = .9668, $P < .599$). These results are illustrated in the figure. Thus group \times time interactions indicated that group 1 was significantly different from groups 2 and 3.

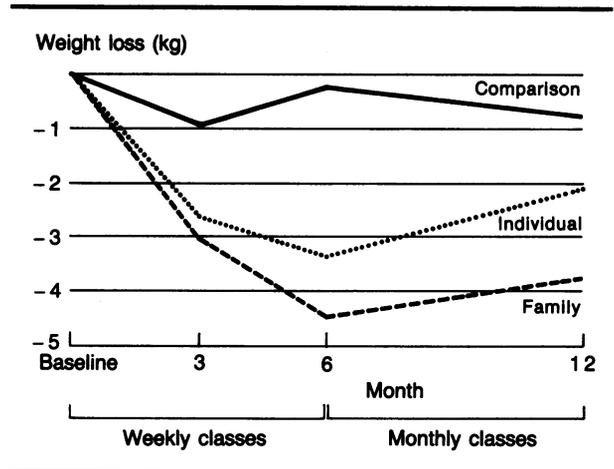
Discussion

The purpose of this study was to evaluate the effectiveness of a family-based weight loss intervention for obese Mexican American women compared with a traditional program oriented to the individual and an information-only comparison group. The results supported the hypothesis that the two treatment groups would be more successful in losing weight than the information-only control group. The two treatment groups were taught using techniques specifically for adults with limited literacy skills, such as a personal approach, group support, and a variety of experiential teaching methods (45). Support from the group and the instructor may also have been a factor in these subjects' weight loss.

Although the figure reveals a trend for the family intervention to be more effective than the program for the individuals, this difference was not significant. The family program was designed to actively involve family members in making diet and exercise changes, but actively involving the subjects' husbands was difficult in this study. Although husbands were encouraged to attend classes, fewer than 50 percent attended any of the classes. Possible reasons included lack of time, as many worked in the evenings or were involved in other activities; lack of energy, with many reporting being too tired after working all day; and lack of interest, as many felt that food and health were women's issues. The lack of male instructors may also have been a factor.

Weight loss in this study was modest, with the women in the family group averaging 6.6 and 9.9 pounds after 3 and 6 months, and those in the individual group averaging 5.7 and 7.2 pounds after 3 and 6 months of treatment. These results

Mean weight loss in kilograms (kg) in three groups of Mexican American women during 12 months



compare favorably to the 8.5 lb. average weight loss reported from early weight loss programs conducted in 1974, but not as favorably with more recent averages of 15.4 lb. from 1984 (46). However, because programs also lengthened from 8.4 weeks in 1974 to 13.2 weeks in 1984, average weight loss per week has not changed during this time.

While weight loss averages were small, they may have some clinical significance in a population known to be at risk for diabetes and hypertension. In other populations modest weight losses (10 lb.) have been found to have beneficial effects on blood pressure in mild hypertensives (47). Decreases of 5 to 10 lbs. have been found to improve plasma glucose in patients with noninsulin dependent diabetes mellitus (48).

The results of this study must be interpreted with some caution because of the large number of subjects with no data available at one or more of the followup measurement sessions. Although there were no discernible differences between these subjects and those included in the analyses on any of the initial measures, including initial weight, BMI, and demographic variables, it is possible that they might have differed on subsequent measures. Unfortunately, high attrition rates are not uncommon over a 1-year period in research conducted with low-income minority subjects, due in part to the high mobility of the study population and to competing demands on subjects' time and energy (49). Future research should continue to develop appropriate interventions and measurement strategies for this population that will maximize the

likelihood of long-term behavior change and program participation.

Future programs should also identify ways to involve more actively members of subjects' natural support groups. For example, husbands might be more likely to participate in the program if they were offered weight-training classes while their wives attended the nutrition classes. Recruiting other family members and friends may be more successful than involving husbands, if these are the people from whom support for making dietary and exercise changes is needed. Because Mexican Americans are less likely to have already adopted diet and exercise behaviors for weight or cholesterol control, subjects seeking to make changes in their eating and exercise habits may not receive practical and emotional support for the changes. Many of our subjects reported active efforts to sabotage their new behaviors by friends and family who were disturbed by these changes.

While the weight loss reported in this study may not be of the magnitude reported with highly motivated, white, middle-class samples, it represents a first attempt to work with an underserved and poorly understood population. These data indicate that it is possible to develop a weight loss program that is consistent with the foods and values prevalent in the Mexican American culture. Although intensive programs such as the one described in this study are effective, it is impossible to reach every member of the Hispanic community with such programs. Future studies should provide information on nutrition, exercise, and behavior change strategies to larger segments of the Mexican American population through community involvement and media channels. Working with existing systems such as churches, community organizations, clinics, and the natural networks of friends and relatives will probably achieve the most effective results if these efforts are supported by community-wide education programs disseminated through both Spanish- and English-language media.

References.....

1. U. S. Bureau of the Census: Statistical abstract of the United States. U.S. Government Printing Office, Washington, DC, 1982.
2. Diehl, A. K., and Stern, M. P.: Special health problems of Mexican Americans: obesity, gallbladder disease, diabetes mellitus, and cardiovascular disease. *Adv Intern Med* 34: 73-96 (1989).
3. Mitchell, B. D., et al.: Risk factors for cardiovascular mortality in Mexican Americans and non-Hispanic whites. *Am J Epidemiol* 131: 423-433 (1990).
4. Samet, J. M., et al.: Diabetes, gallbladder disease, obesity, and hypertension among Hispanics in New Mexico. *Am J Epidemiol* 128: 1302-1311 (1988).
5. Stern, M. P., et al.: Cardiovascular risk factors in Mexican Americans in Laredo, Texas. I. Prevalence of overweight and diabetes and distributions of serum lipids. *Am J Epidemiol* 113: 546-555 (1981).
6. Stern, M. P., et al.: Cardiovascular risk factors in Mexican Americans in Laredo, Texas. II. Prevalence and control of hypertension. *Am J Epidemiol* 113: 556-562 (1981).
7. Stern, M. P., Pugh, J. A., Gaskill S. P., and Hazuda, H.: Knowledge, attitudes, and behavior related to obesity and dieting in Mexican Americans and anglos: the San Antonio Heart Study. *Am J Epidemiol* 115: 917-928 (1982).
8. National Center for Health Statistics: Advance report of final mortality statistics, 1987. Monthly vital statistics report 38, No. 5 (suppl.). Public Health Service, Hyattsville, MD, 1989.
9. Centers for Disease Control: Morbidity and Mortality Weekly Report: Prevalence of overweight for Hispanics—United States, 1982-1984. *JAMA* 263:631-632, Feb. 2, 1990.
10. Life Sciences Research Office, Federation of American Societies for Experimental Biology: Nutrition monitoring in the United States—an update report on nutrition monitoring. DHHS Publication No. (PHS)89-1255, U.S. Department of Agriculture/U.S. Department of Health and Human Services, Public Health Service, Washington, DC, 1989.
11. Haffner, S. M., et al.: Do upper-body and centralized adiposity measure different aspects of regional body-fat distribution? Relationship to non-insulin-dependent diabetes mellitus, lipids, and lipoproteins. *Diabetes* 36: 43-51 (1987).
12. Reichley, K. B., et al.: Centralized obesity and cardiovascular risk in Mexican Americans. *Am J Epidemiol* 125: 373-386 (1987).
13. Mueller, W. H., et al.: The Diabetes Alert Study: Growth, fatness, and fat patterning, adolescence through adulthood in Mexican Americans. *Am J Phys Anthropol* 64: 389-399 (1984).
14. Joos, S. K., Mueller, W. H., Hanis, C. L., and Schull, W. J.: Diabetes Alert Study: Weight history and upper body adiposity in diabetic and non-diabetic Mexican American adults. *Ann Hum Biol* 11: 167-171 (1984).
15. Guernika, A., and Kasperuk, I.: Reaching the Hispanic market effectively. McGraw-Hill, New York, NY, 1982.
16. U.S. Bureau of the Census: General population characteristics: Texas. Current Population Reports, U.S. Government Printing Office, Washington, DC, 1983.
17. Hazuda, H. P., Haffner, S. M., Stern, M. P., and Eifler, C. W.: Effects of acculturation and socioeconomic status on obesity and diabetes in Mexican Americans: the San Antonio Heart Study. *Am J Epidemiol* 128: 1289-1301 (1988).
18. Falicov, C.: Mexican families. *In* Ethnicity and family therapy, edited by M. McGoldrick, J. Pearce, and J. Giordana. Guilford Press, New York, NY, 1982, pp. 134-163.
19. Tamez, E. G., and Vacalis, E. G.: Health beliefs, the significant other and compliance with therapeutic regimens among adult Mexican American diabetics. *Health Educ* 20: 24-31 (1989).

20. Dolocek, T. A., et al.: Cardiovascular risk factor knowledge and belief in prevention among adults in Chicago. *Am J Prev Med* 2: 262-267 (1986).
21. Kumanyika, S., et al.: Beliefs about high blood pressure prevention in a survey of blacks and Hispanics. *Am J Prev Med* 5: 21-26 (1989).
22. Ramirez, A. G., Herrick, K. L., and Weaver, F. J.: El asesino silencioso: a methodology for alerting the Spanish-speaking community. *Urban Health* 10: 44-48 (1981).
23. Hazuda, H. P., et al.: Ethnic differences in health knowledge and behaviors related to the prevention and treatment of coronary heart disease: the San Antonio Heart Study. *Am J Epidemiol* 117: 717-728 (1983).
24. Knapp, J. A., et al.: A saturated fat/cholesterol avoidance scale: sex and ethnic differences in a biethnic population. *J Am Diet Assoc* 88: 172-177 (1988).
25. Borrud, L. G., et al.: Food group contributions to nutrient intake in whites, blacks, and Mexican Americans in Texas. *J Am Diet Assoc* 89: 1061-1069 (1989).
26. Newell, G. R., et al.: Nutrient intakes of whites, blacks, and Mexican Americans in Southeast Texas. *Prev Med* 17: 622-633 (1988).
27. Haffner, S. M., et al.: Dietary intakes of macronutrients among Mexican Americans and Anglo Americans: the San Antonio Heart Study. *Am J Clin Nutr* 42: 1266-1275 (1985).
28. Patterson, T. L., et al.: Aggregation of dietary calories, fats, and sodium in Mexican American and Anglo families. *Am J Prev Med* 4: 75-82 (1988).
29. Nader, P. R., Sallis, J. F., and Patterson, T. L.: A family approach to cardiovascular risk reduction: results from the San Diego Family Health Project. *Health Educ Q* 16: 229-244 (1989).
30. Patterson, T. L., et al.: Familial similarities of changes in cognitive, behavioral, and physiological variables in a cardiovascular health promotion program. *J Pediatr Psychol* 14: 277-292 (1989).
31. Fortmann, S. P., et al.: Effect of health education on dietary behavior: the Stanford Three Community Study. *Am J Clin Nutr* 34: 2030-2038 (1981).
32. Black, D. R., and Threlfall, W. E.: Partner weight status and subject weight loss: implications for cost-effective programs and public health. *Addict Behav* 14: 279-289 (1989).
33. Epstein, L. H., et al.: Child and family weight loss in family-based behavior modification programs. *J Consult Clin Psychol* 49: 674-685 (1981).
34. Brownell, K. D., et al.: The effect of couples training and partner cooperativeness in the behavioural treatment of obesity. *Behav Res Ther* 16: 323-333 (1978).
35. Garn, S. M., and Clark, D. C.: Trends in fatness and the origins of obesity: ad hoc committee to review the ten-state nutrition survey. *Pediatrics* 57:443-456 (1976).
36. Hartz, A., Giefer, E., and Rimm, A. A.: Relative importance of the effect of family environment and heredity on obesity. *Ann Hum Genet* 41: 185-193 (1977).
37. Klesges, R.C., et al.: Parental influences on children's eating behavior and relative weight. *J Appl Behav Anal* 16: 371-378 (1983).
38. DeBakey, M. E., Gotto, A. M. Jr., Scott, L. W., and Foreyt J. P.: *The living heart diet*. Raven Press/Simon & Schuster, New York, 1984.
39. Haffner, S. M., et al.: Dietary intakes of macronutrients among Mexican Americans and Anglo Americans: the San Antonio Heart Study. *Am J Clin Nutr* 42: 1266-1275 (1985).
40. Marlatt, G. A., and Gordon, J.: *Relapse prevention*. Guilford Press, New York, NY, 1985.
41. American Heart Association, Texas Affiliate: *Heart treasure chest*. Dallas, TX, 1983.
42. Cuellar, I., Harris, L., and Jasso, R.: An acculturation scale for Mexican American normal and clinical populations. *Hisp J Behav Sci* 2: 199-217 (1980).
43. Milliken, G. A., and Johnson, D. E.: *Analysis of messy data: designed experiments, vol. I*. Van Nostrand Reinhold Co., New York, NY, 1984.
44. Bray, G. A.: Effects of obesity on health and happiness. *In Handbook of eating disorders* by K. D. Brownell and J. P. Foreyt. Basic Books, New York, NY, 1986, pp. 3-44.
45. Urdaneta, M. L., and Krehbiel, R.: Cultural heterogeneity of Mexican Americans and its implications for the treatment of diabetes mellitus type II. *Med Anthropol* 11: 269-282 (1989).
46. Brownell, K. D., and Wadden, T. A.: Behavior therapy for obesity: Modern approaches and better results. *In Handbook of eating disorders* by K. D. Brownell and J. P. Foreyt. Basic Books, New York, NY, 1986, pp. 180-197.
47. Langford, H. G., et al.: Effect of drug and diet treatment of mild hypertension on diastolic blood pressure. *Hypertension* 17: 210-217 (1991).
48. Watts, N. B., et al.: Prediction of glucose response to weight loss in patients with NIDDM. *Arch Intern Med* 150: 803-806 (1990).
49. Baranowski, T., et al.: A center-based program for exercise change among black American families. *Health Educ Q* 17: 179-196 (1990).